Forest Insect Conditions on the Targhee National Forest
1967

The following is an evaluation of current forest insect problems on the Targhee National Forest in 1967. Material for this report was compiled from previous evaluation reports, from aerial survey data, from special on-the-ground surveys and from less intensive examinations of other insect problems on the Forest this year.

The principal Forest insect problems are the same as last year--mountain pine beetle, spruce budworm and sugar pine tortrix. Briefly, the mountain pine beetle remains epidemic with tree killing forecast at a somewhat reduced level in 1968. Past and present control efforts have reduced tree killing in some areas, but have been unsuccessful in curtailing the infestation. Spruce budworm populations continued to decrease in practically all areas of past activity, but cropped up in one new area on the south tip of the Forest. Defoliation of lodgepole pine by the sugar pine tortrix continues, but considerably under the 1966 level. A more detailed and comprehensive discussion of these insect problems follows.

Mountain pine beetle, Dendroctonus ponderosae Hopk.

A comparison of the 1966 aerial survey map with this year's survey map shows some changes in the intensity of the mountain pine beetle infestation in lodgepole pine but little change in its overall distribution. The mountain pine beetle continues to kill vast areas of lodgepole pine from the Spencer District in the north through the entire length of the Forest to the Swan Valley District in the south. Considerably fewer red topped lodgepole (1966 attacks) were recorded on the Spencer and Rexburg Districts; an even further weakening of the population is forecast for 1968. However, a general increase in the number of dead trees was noted in other areas of the Forest, particularly in portions of the Ashton, Porcupine and Driggs Districts, and in the southwest corner of Yellowstone National Park. The distribution and intensity of the mountain pine beetle infestation as determined by the 1967 aerial detection survey was shown on a map mailed to the Forest earlier.

The increased tree killing in areas where declining to static conditions were predicted for 1967 strengthened our doubts as to the efficacy of the existing mountain pine beetle sampling system. In areas where increased activity was called for, decreases occurred; similarly, where declining conditions were predicted, increases occurred. These inconsistencies were Region-wide and have been accumulating for a number of years now. We suspected these shortcomings last year, and although we lacked definite information to prove otherwise, we nevertheless tempered our evaluations to include empirical judgment.

With the existing sampling method, predictions of population trend are determined from fall brood counts of one generation and projected to the succeeding generation. However, in the interval between fall counts of one generation and successful tree attacks by the following generation,

there is a complex of factors which influence both population abundance and trend. These include parasites, predators, temperature and moisture conditions, intraspecific competition, disease, physiological changes and effects, food quality and quantity, flight and dispersal, and finally, the availability of suitable host trees--to name a few. The point we want to make here is that we simply do not know enough about the population dynamics of this insect to enable us to predict with a high degree of certainty, the status of the population so far in advance. Sampling of the fall brood, however, has some useful qualitative meaning; that is presence or absence of brood and, perhaps, comparison of relative brood numbers from one year to the next. Also, in performing these counts, we are able to observe and record the occurrence of discernible mortality, the presence and relative abundance of parasites, predators and associated beetles, as well as the apparent physiological condition. Although fall brood counts may or may not be indicative of trend, they were lower this year than they were in the two previous years. Brood counts this year averaged 197 per square foot, compared to 204 1/ per square foot in 1966 and 327 per square foot in 1965, a gradual but steady decrease. The nearer brood counts are made to final emergence, the more accurately they portray population trend.

In addition to the aerial survey, and other visits to the Forest on other entomological problems, more than 25 man days were spent during late October in evaluating the mountain pine beetle problem. Those participating in the evaluation were entomologists Bruce Baker, Spencer Reidel, Kendall Lister, Bill Klein and Forestry Technician Otto Sandin. In addition to brood counts and other aforesaid factors, observations were made on stand composition and depletion, and pitchout and attack ratios. Attack ratios, which more accurately depict present trend, were determined simply by walking through the infested stands and recording both new (1967) and old (1966) attacks. The transects were usually run perpendicular to the contours except in portions of treatment areas in Zone 3 where the infestation is moving from the Forest boundary, easterly into the upper drainages. Here attack ratios were determined along an east-west line wherever possible. Anywhere from 3 to 5 hours was spent in a given area, depending of course, on terrain, stand composition and density, and attack density. In addition, a green stand cruise was conducted in the Yellowstone--Bechler area to provide an estimate of stand structure during the initial stages of a potential outbreak. This data will be presented in a separate evaluation report to Yellowstone National Park. We will send you a copy.

Following is a summary of the quantitative data taken on the Targhee National Forest during the 1967 mountain pine beetle biological evaluation survey. For convenience of discussion the various sample locations are grouped according to treatment zones. Attack ratios are given for each area and an average attack ratio is completed for each treatment zone. Brood numbers are on a square foot basis and the corresponding trend

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Zone	Area	Attack Ratio 1966	Attack Ratio 1967	Average Fall Brood Density/sq. ft.	Trend **
2	Dry Canyon	1.8	1	106	Decreasing
	Shotgun Well	1.1	1	154	Decreasing
	Green Canyon	1.7	1	98	Decreasing
	Bend Ridge	11	1	No sample taken	
	Hale Canyon	1.3	1	190	Increasing
	Average	1.6	1		
4	Warm River	1	1	232	Increasing
	Warm River Butte	1	1.2	270	Increasing
	Dry Robinson Creek	1	1.3	413	Increasing
	*Yellowstone	1	3.2	416	Increasing
	Spring Creek	7	1	141	Decreasing
	Porcupine	1	1.1	189	Decreasing
	Conant Creek	1	1.2	260	Increasing
	Average	1	1.1		
3	McRenolds Rd.	1.8	1	206	Increasing
	Rammel Mtn. Rd.	1	1.8	158	Decreasing
	Grouse Creek	1	2.8	173	Static
	Rammel	1	1.8	132	Decreasing
	N. Leigh Creek	1.9	1	143	Decreasing
	Day Creek	1	2.2	270	Increasing
	Darby Canyon	1	4.4	210	Increasing
	Average	1	1.9		
Rexburg	Windy Ridge	1.2	1	179	Static
	Moody Swamp	1	1.1	161	Decreasing
	Calamity Creek	1.8	1	142	Decreasing
	Horseshoe Creek	1.6	1	249	Increasing
	Average	1.1	1		
Pine Cr.	North Pine Creek	1	2	227	Increasing
	West Pine Creek	1	13	157	Decreasing
	Mike Spencer	1	2.1	345	Increasing
	Average	1	2.9	197	

* Out of Forest. Bechler-Cave Falls area.

** Determined from a Sequential Sampling Plan. (Developed by W. E. Cole, Intermountain Forest and Range Experiment Station)

predictions, however relevant, were extracted from Cole's sampling plan.

Biological control factors have been building up in the older infestations and have held the beetle populations in check in some areas and have prevented catastrophic buildups in others. Last year parasites and predators were more plentiful than before, competition from ips beetles increased, and woodpeckering of the overwintering broods was particularly evident in portions of the Spencer, Ashton and Rexburg Districts, and along the Forest boundary extending from Little Butte in the north to Darby Creek in the south. In the newer infestations all of these factors are present to some degree, but are less plentiful, hence less effective. It is these areas and possibly many of the control areas, that contain a sufficient number of suitable host trees and an unfavorable beetle/parasite-predator ratio, where the infestation will continue to increase. Our direct control program has also been responsible for at least reducing the immediate losses in most of our control areas, and possibly delaying the infestation in adjacent areas.

Noteworthy increases occurred in both the North and West Forks of Pine Creek, in Poison Creek, and in Mike Spencer Canyon. Unfavorable attack ratios and other factors indicate increased tree killing in these areas in 1968.

Approximately the same number of trees were attacked this year as last generally throughout most of the control areas. The reinfestation rate varied from area to area but was generally higher in those treated areas adjacent to non-treated areas. No doubt some invasion into the treated areas from the non-treated areas occurred, but in other areas the unexpected high reinfestation rate resulted from untreated brood trees.

Repeated control efforts have had little apparent effect on the eventual buildup in the southwest corner of Yellowstone National Park. According to Park Service survey data, this area of approximately 6,000 acres now contains slightly more than 18,000 infested trees, a threefold increase from last year. Our survey also showed a 3 to 1 increase with a potential for a similar increase in 1968. In this area there is sufficient lodgepole pine of adequate size to build up a mountain pine beetle outbreak and perpetuate it for several years. Only an "act of nature" will prevent a like situation from developing in the almost pure, contiguous, mature and overmature lodgepole stands on the Moose Creek Plateau in the Island Park District. The greatest single increase on the Forest this year and next will be in the Pine Creek drainage on the Rexburg-Swan Valley District border.

Although individual tree control has temporarily reduced beetle numbers, it has had little noticeable effect on the beetle's innate capacity to increase. In most of the control areas, mountain pine beetle populations are expected to increase. Single tree control has not eliminated the underlying cause of all mountain pine beetle epidemics, namely the extensive areas of mature and overmature lodgepole pine. As long as susceptible

trees remain, the beetle will continue, to kill singly or in small groups, until the stand is finally converted to a less susceptible state. The depletion of such stands on the Forest and in the Region is eventual, unless sound forest management objectives are established and practiced.

Under present conditions we do not believe the infestation can be controlled. Continued direct treatment can at best, be only an expensive delay of the inevitable.

Spruce budworm, Choristoneura occidentalis

The first report of significant budworm activity on the Targhee National Forest was in 1956. After that, infestations increased in severity and size until 1963, when upward of 200,000 acres of Douglas-fir, true fir, and Engelmann spruce were protected by aerial spraying. Since then, budworm populations have declined naturally and remained at a relatively low level. For comparative purposes, a breakdown of defoliated area by damage classes for this year and the previous two years as delimited by aerial surveys follows:

	Defoliation Intensity			
Year	Light	Medium	Heavy	Total
1965	46,100	42,600	9,200	97,900
1966	14,600			14,600
1967	6,300	3,700		10,000

The relatively large areas of past defoliation on portions of the Spencer and Island Park Districts were practically non-existent this year. These areas were ground checked during mid-July and although an occasional budworm larva could be found, there was no discernible feeding damage to the trees. This lack of noticeable defoliation was substantiated a month later during the aerial survey.

The newer infestation in the Pine Creek drainage, first reported in 1966, was also invisible from the air this year. Subsequent ground checks found only negligible activity in Pole Creek Canyon and in the head of Rammel Creek. Very light defoliation of Douglas-fir, subalpine fir and Engelmann spruce was observed for the second straight year in Mike Spencer Canyon, however. The exceptionally heavy cone crop on Engelmann spruce and Douglas-fir confounded visual survey efforts, both from the air and on the ground.

The few recognizable areas of spruce budworm activity on the Forest this year are in the Swan Valley District in the extreme southeast corner of the Forest. This is a new infestation and is part of a general outbreak that covers adjoining portions of the Bridger and Teton National Forests. On the Targhee portion the infestation covers approximately 10,000 acres of light to medium defoliation with Douglas-fir, subalpine fir, and Engelmann spruce the hosts.

Systematic egg mass counts give a reliable estimate of population trend and resulting damage. Because of the overall declining nature of the infestation and the absence of visible defoliation, only three egg mass evaluation stations were established on the Forest this year. However, egg mass sampling was also undertaken in the Bridger infestation which is part of this general outbreak. The results of these two surveys and predictions as to the forthcoming population level and expected defoliation follows:

Forest	Area	No. Egg Masses/ 1000 sq. in. 1967	Percent Expected Defoliation 1968	Trend
Targhee	Cabin Creek	1.0	15	Static
	Pole Canyon	0.3	15	Static
	Gillan Creek	0.2	15	Static
Bridger	Bailey Creek	74.3	90 - 100	Increasing
	Higby Creek	5.0	25 - 50	Increasing
	Steer Creek	1.0	15	Increasing
	Bull Hollow	18.4	90 - 100	Increasing
	Porcupine	30.9	90 - 100	Increasing

The Bridger infestation, incidentally, covers some 52,000 acres with most of the current defoliation classed as moderate with only a few areas in the heavy category. In Martin Creek and in other small drainages on the Teton National Forest, directly across the Snake River from Cabin Creek, only light defoliation occurred.

Although only light defoliation is predicted for Cabin Creek and nearby drainages, the infestation will probably spread to many of the smaller side drainages of the Snake River Canyon. Negligible defoliation will occur in Pine Creek and its tributaries with little or no damage showing up in other areas of past budworm activity on the Forest. The Bridger infestation to the immediate south will suffer heavy to extreme defoliation in some areas but overall damage will not be great enough to warrant control measures in 1968.

All of the infestation areas, past and present, will be closely watched in 1968.

Sugar pine tortrix, Choristoneura lambertiana

The sugar pine tortrix continues to defoliate many of the lodgepole pine stands on the Targhee National Forest, but with less intensity than that recorded in 1966. Because of the relatively light feeding activity and the inherent difficulty of detecting light damage by this insect from the air, no defoliation was observed or recorded during the aerial survey. Nonetheless, special ground examinations were made this summer to determine the distribution of the insect and to record its damage.

The general distribution of the tortrix remains essentially the same as that recorded in 1966 - west of Bishop mountain in the north along Big Bend Ridge, and south to Teton Creek along the west slope of the Grand Teton Range. In fact, if one looks hard enough this insect, its remains or damage, can be found in practically any lodgepole pine stand on the Forest.

Heaviest defoliation occurred between Squirrel Creek and the North Fork of Leigh Creek. Defoliation intensity varied from area to area but in most instances, smaller trees--those under 30 feet high--suffered the heaviest damage. Very little defoliation was experienced by the larger trees. In the smaller trees, most of the feeding was confined to the new growth and centered on the terminal leaders, which is characteristic of this insect when their numbers are few. Although feeding was restricted to the new growth, it is doubtful whether serious damage will occur, other than some possible loss of increment.

The usual heavy infestation west of Island Park Reservoir was at an extremely low level this year. This respite may allow many of the more heavily damaged trees to survive.

This defoliator has been active in lodgepole stands for many years; it has yet to cause significant damage except in the Bishop Mountain area. In some instances, particularly in slow growing lodgepole on exceptionally poor sites, repeated heavy feeding will kill terminal and lateral leaders, causing forking and deformation. Although cessation of feeding activity will allow these trees to recover, it is unknown whether they will recover enough to eventually produce merchantable sawlogs. In the faster growing trees, however, multiple branching seldom occurs. Although it has not yet been determined, repeated defoliation may retard growth somewhat. Such damage is neither severe nor extensive enough to warrant direct control measures at this time.

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